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FLORISTIC COMPOSITION OF A SACRED GROVE IN IGBARA-OKE, ONDO STATE, NIGERIA.

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ABSTRACT

The floristic composition of Igbo-Olua sacred grove of Igbara-Oke, Ondo State, Nigeria was assessed. The sacred grove regarded as cluster was divided into two with a line transect that ran North-South of the forest. At the midpoint along the transect line, a plot of 50m x 50m was laid at the right side. All living trees with diameter at breast height (dbh) ≥10cm on each field plot were recorded by species. All trees were assigned to families and relative density (number of species in a family) was obtained. The tree species diversity in Igbo-Olua sacred grove showed the total number of individuals recorded to be 90, distributed among 52 tree species. Among the families, Moraceae had the highest number of species (7), followed by Sterculiaceae (6), Euphorbiaceae (5), Meliaceae (4), Sapotaceae (4). Among the families where low species was recorded were Bombacaceae (1) and Ebanaceae (1).In terms of relative abundance, only one general (*Cola*) came out clearly as the most abundant. Others were *Funtumia, Ficus, Milicia*, and *Celtis.* Other abundant species were *Funtumia elastic* (7), *Khaya grandifoliola* (4), *Entandrophragma angolense* (5), *Cola nitida* (5). The species that comprised low abundance included *Ceiba pentandra (1)* and *Chrysophyllum albidum (1).*The species that had the highest Important Value Index (IVI) was *Entandrophragma angolense* (13.88), followed by *Albizia ferruginea* (7.25%) and *Funtumia elastic* (6.28%). Among the species with low IVI are: *Ricinodendron heudelotii* (0.58%), *Diospyros dendo* (0.58%) and *Chrysophyllum purpureum* (0.65%). About 40% of the trees encountered were in the diameter class of 10 -20cm. The study highlighted the necessity to consider cultural values and indigenous knowledge when developing conservation policies.

INTRODUCTION

Tropical forests are the most species rich and diverse forests on earth, estimated to contain at least 50% of all plants and animal species (Myers 1986). This is especially true for wet tropical forest, where, for example, some 700 tree species have been recorded in 10 selected 1-hectare plots in Borneo (UNEP 1995). However, many of these forests are losing these properties due mainly to interference by anthropogenic actions. The rate of deforestation has been estimated variously for different parts of the world. In Nigeria, the annual rate of deforestation has been estimated as ranging between 3% to 5% (Ojo, 2004). A forest resource study carried out by the Federal Department of Forestry (1988) revealed that the

forest estate of Nigeria has been very highly depleted. It was estimated that only about 974,674 hectares of the forest reserves is productive while another 2,342,147 hectares of free areas is partially productive. However, these may just be guess estimate and far from reality.

In Nigeria, especially in south western part of the country, sacred groves still stand out distinctly as relicts of each particular ecosystem and are rich in biological diversity. Result of previous study by Alabi (1992) showed that comparative plant density analysis showed richer floristic composition and more complex structure in the sacred groves than in the surrounding areas over the years. Several case studies of the definition of sacred grove have been highlighted (Okali and Amubode, 1995; Alabi (1992). Okali and Amubode (1995) reported the existence of three sacred groves (*Igbo Itamafo, Igbo- orisa* and *Orisagogoro*) at *Oboto*, Ondo state, Nigeria used as shrine, burial ground and religious practices. Traditional religious and cultural practices thus contributed greatly to restricting and controlling the utilization of the resources of these very representative land areas (Godson, 1998). This paper is perhaps the first record on the floristic composition on Igbo-Olua sacred grove of Igbara-Oke, Ondo State, Nigeria.

MATERIALS AND METHODS

Study Area

The study area is part of the tropical rainforest ecosystem occurring in south west Nigeria. It is located at Igbara Oke in Ifedore Local Government Area, Ondo state on Lat. $7^{0}24^{1}0^{11}$ and Long. $5^{0}3^{1}0^{11}$. There is a distinct dry and rainy seasons, having an average annual rainfall and temperature of 1489mm and 26.5ºC respectively. Soils are predominantly ferruginous tropical, typical of the variety found in intensively weathered areas of basement complex formations in the rainforest zone of south-western Nigeria (Onyekwelu, *et al*., 2008).The national report of FEPA (1992) recorded 5, 018 plant species in Nigeria lowland rainforest ecosystem of which 205 are endemic .There are also 247 species of mammals.

Igbo-Olua forest is an ancestral heritage for the community, a symbol of unity and peace to the community. The forest stands as a major cultural site for the annual festivals. The festivals are: Yam festival (Odun Ijesu), *Alabasaba* festival, *Ijobi* festival and *Ikedi* festival where cow is killed ones in three years for the rituals. The importance of this forest to the community has been established in praising each other *"Olua Ugbara a gbe ketera o"* meaning "the god (Olua) of Igbara will bless all". Igbara-Oke community has a big mud house, housing Olua shrine which is located outside the sacred grove. Ritual was performed before the tree assessment in the sacred grove.

Vegetation studies

The sacred grove regarded as cluster was divided into two with a line transect that ran North-South of the forest. At the midpoint along the transect line, a plot of 50m x 50m was laid at the right side with clockwise orientation. All living trees with diameter at breast height (dbh) $\geq$10cm on each field plot were recorded according to species. All trees were assigned to families and relative density (number of species in a family) was obtained for tree species diversity classification.

Data Analysis

Tree species classification

All plant species encountered were classified into families and frequency. Their frequencies of occurrence were obtained to ascertain species abundance / richness of floral composition on and species evenness. The following biodiversity indices were used to obtain the diversity, evenness within the forest in the sacred grove.

a. **The species relative dominance (RD %):** This was obtained using the Formula given by Brashear's *et al* (2004)

$$RD_O = \frac{(\sum Ba_1 \times 100)}{\sum B_{an}} \quad \text{----------} \quad (eqn.\ 1)$$

Where:

RD_O = Relative Dominance

B_{ai}= Basal area of individual tree belonging to tree species ith

B_{an} = Stand basal area

b. **Species Relative density (RD):** Refers to the number of individual of a given species divided by to the total number of individual of all Species that was found.

$$RD = \frac{ni \times 100}{N} \quad \text{----------} \quad (eqn.\ 2)$$

RD = relative density

n_i= number of the individual of species

N = total number of individual in the entire population.

The relationship, $\underline{RD + RD_o}$

2 gave the important value index(IVI) for each species…..(eqn.3)

RESULTS AND DISCUSSION

Species Frequency and Distribution

The present study revealed that the sacred grove of rainforest ecological zone represents the remnants of the relic and unique vegetation of the tropical rain forests. The tree species diversity in Igbo-Olua sacred grove showed the total number of individual recorded to be 90, while the total of 52 tree species were distributed. In terms of relative abundance, only one general (*Cola*) came out clearly as the most abundant. Others were *Funtumia, Ficus*, *Milicia*, and *Celtis.* Other abundant species were *Funtumia elastic* (7), *Khaya grandifoliola* (4), *Entandrophragma angolense* (5), *Cola nitida* (5),*Albizia ferruginea* (6), *Trilepisium madagascariensis* (3). Other species that comprised low abundance included *Ceiba pentandra (1), Chrysophyllum albidum, (1), Ricinodendron heudelotii (1)* and *Ficus goliath (1).* (Table 1).The floristic composition of the sacred groves indicates the pre-existence of climax vegetation in the area (Vartak*et al.,* 1986).

Important Value Index (VI) is used to determine the overall importance of each species in the community structure. In calculating this index, the relationship, RD +RD_o/ 2 gave the Important Value (IV) for each species. The Value Index of the enumerated species in all the sacred groves fell in the range of 0.19% - 26.38%. Generally, important Value Index (IVI) combines density and frequency (dominance) into a single measure to analyze a plant community. Low tree species were recorded in some of these sacred groves, and this could be attributed to lack of dominance by one of the species. This supported Tsingalia (1990) earlier work that low ecological status of most of the species in the study was attributed to lack of dominance by any one of the species, which suggests positive interactions among the tree species. Oyun, *et al.,* (2009) also reported that the low IVI may also imply that most of the species in the forest are rare. As such, these groves serve the vital function in preservation of plant species that have become very rare or extinct elsewhere

The species that had the highest IV was *Entandrophragma angolense* (13.88), followed by *Albizia ferruginea* (7.25%), *Funtumia elastica* (6.28%). Among the species with low IVI are: *Ricinoden dronheudelotii* (0.58%), *Diospyros dendo*(0.58%), *Bridelia micrantha* (0.59%), *Cola gigantean* (0.64%), *Discoglypremnacalonuera* (0.65%) and *Chrysophyllum purpureum* (0.65%).

Family Composition

A graph of the tree species families were represented in Fig. 2. Among the families, Moraceae had the highest number of species (7), followed by Sterculiaceae (6), Euphorbiaceae(5), Meliaceae (4), Sapotaceae (4), Apocynaceae (4). Among the families where low species was recorded were Bombacaceae (1), Ebanaceae (1), Rubiaceae (1), Agavaceae (1), Chrysobalanaceae (1). Sterculiaceae and Euphorbiaceae were reported by Ojo (2004) as forming 86% of the stand in Abeku sector of Omo Forest Reserve. Oduwaiye *et al.* (1998) in his work on Okomu Forest Reserve also reported high species

diversity in Meliaceae. The preponderance of occurrence or species in families with high diversity may be due to their method of seed dispersal. Ogunleye *et al*. (2004) reported the dominance of Meliaceae in Olokemeji Forest Reserve because of easy wind dispersal which enhanced their speed in the study location. Soladoye, *et al.* (2005) also observed that the dispersal mechanism plays a strong role in addition to climatic condition and soil type in the preponderance of species of Euphorbiaceae on the Olabisi Onabanjo University, permanent site.

Size Class Distribution

The result of the various diameter class sizes are presented in Fig. 3. The structure of the population of the sacred grove was nearly or typically inverted J-shaped curve. The average D_{max}distribution of the tree species followed an approximately normal distribution, with a peak, between 40 and 100cm dbh. Fig. 3 showed the size class distribution of all trees in the forest. The distribution is typical of natural forest with high number in the smaller size classes and a more or less logarithmic decline with increasing size class (Swane *et. al.,* 1987). The highest frequency was in the diameter class of 20-29.99cm.In the sacred grove, about 40% of the trees encountered were in the diameter class of 10 -20cm. This showed larger population of the trees falls in the lowest diameter size class; the trees with dbh ≥ 40cm were very low. According to Nath *et al.,* (2005), the inverted J –curve, where the abundance decreases with increasing diameter, is an indication of good regeneration of the constituent species. This conform with the population structure of trees in the sacred grove to this reverse J –shaped structure. Oduwaiye, *et al.,* (2002) reported that all plots studied by them had the largest number of trees in the smallest diameter class of below 10cm at the Okomu permanent sample plots. They also had the smallest number of trees in the diameter class of 25 -30cm.

Table 1: Tree Species Diversity Indices of Igbo-Olua Sacred Grove, Igbara-Oke

Family	Species	F	Mean dbh (cm)	Max dbh (cm)	RDo (%)	RD (%)	IV (%)
Caesalpinoideae	*Anthonatha macrophylla*	1	28.0	28.0	0.3484	1.1111	0.7298
	Dialium guineense	3	69.0	104.0	7.5368	3.3333	5.435
Bombaceae	*Ceiba pentandra*	1	89.0	89.0	3.5198	1.1111	2.3155
Mimosoideae	*Albizia ferruginea*	6	50.3	80	7.8324	6.6667	7.2495
	Erythrophleum africanum	2	31.0	43.0	0.98204	2.2222	1.6021
Moraceae	*Antiaris africana*	1	67.0	67.0	1.9947	1.1111	1.5529
	Bosqueia angolensis	2	41.0	49.0	1.5508	2.2222	1.8865
	Treculia africana	2	74.5	87.0	5.0715	2.2222	3.6469
	Trilepisium madagascariensis	3	42.7	63.0	2.8413	3.3333	3.0873

	Ficus mucuso	1	102.0	102.0	4.6232	1.1111	2.8671
	Myrianthus arboreus	1	56.0	56.0	1.3935	1.1111	1.2523
	Ficus goliath	1	26.0	26.0	0.3004	1.1111	0.7058
Euphorbiaceae	*Bridelia micrantha*	1	14.0	14.0	0.0871	1.1111	0.5991
	Discoglypremna calonuera	1	21.0	21.0	0.1960	1.1111	0.6535
	Drypetes floribunda	1	22.0	22.0	0.2151	1.1111	0.6631
	Phyllanthus physocarpus	1	61.0	61.0	1.6535	1.1111	1.3823
	Ricinodendron heudelotii	1	11.0	11.0	0.0538	1.1111	0.5824
Ulmaceae	*Celtis mildbreadii*	2	28.0	35.0	0.7403	2.2222	1.4813
	Celtis zenkeri	2	21.5	26.0	0.4288	2.2222	1.3255
Sapotaceae	*Chrysophyllum albidum*	1	21.0	21.0	0.1960	1.1111	0.6535
	Chrysophyllum purpureum	1	48.0	48.0	1.0238	1.1111	1.0675
	Milicia excelsa	1	87.0	87.0	3.3634	1.1111	2.2372
	Milicia regia	2	60.5	78.0	3.5251	2.2222	2.8737
Annonaceae	*Cleistopholis patens*	1	23.0	23.0	0.2351	1.1111	0.6731
	Xylopia aethiopica	1	35.0	35.0	0.5443	1.1111	0.8277
Sterculiaceae	*Cola acuminata*	2	21.5	23.0	0.4128	2.2222	1.3175
	Cola gigantea	1	19.0	19.0	0.1604	1.1111	0.6358
	Cola hispida	1	41.0	41.0	0.7470	1.1111	0.9290
	Cola mildbread	1	45.0	45.0	0.8998	1.1111	1.0055
	Cola millenii	1	22.0	22.0	0.2151	1.1111	0.6631
	Cola nitida	5	24.8	35.0	1.4682	5.5556	3.5119
Boraginaceae	*Cordia millenii*	1	24.0	24.0	0.2560	1.1111	0.6835
Ebenaceae	*Diospyros dendo*	1	12.0	12.0	0.0640	1.1111	0.5876
Agavaceae	*Dracaena mannii*	1	56.0	56.0	1.3935	1.1111	1.2523
Meliaceae	*Entandrophragma angolense*	5	90.0	175.0	22.2031	5.5556	13.8793
	Khaya grandifoliola	4	31.3	52.0	2.0623	4.4444	3.2534
	Lovoa trichilioides	1	25.0	25.0	0.2777	1.1111	0.6944
	Trichilia monadelpha	2	51.0	64.0	2.4618	2.2222	2.3420
Rutaceae	*Fagara macrophylla*	1	23.0	23.0	0.2351	1.1111	0.6731
	Zanthoxylum zanthoxyloides	1	28.0	28.0	0.3484	1.1111	0.7297
Apocynaceae	*Funtumia africana*	1	45.0	45.0	0.8998	1.1111	1.0055

	Funtumia elastica	7	35.7	72.0	4.7742	7.7778	6.2760
	Holarrhena floribunda	3	26.7	44.0	1.1705	3.3333	2.2519
	Holoptelea grandis	1	35.0	35.0	0.5443	1.1111	0.8277
Sapindaceae	*Lecaniodiscus cupanioides*	2	45.5	56.0	1.9379	2.2222	2.0800
Papilionoideae	*Lonchocarpus sericeus*	1	39.0	39.0	0.6759	1.1111	0.8935
	Pterocarpus osun	1	52.0	52.0	1.2016	1.1111	1.1563
Rubiaceae	*Mitragyna stipulosa*	1	46.0	46.0	0.9403	1.1111	1.0257
Chrysobalanaceae	*Parinari robusta*	1	23.0	23.0	0.2351	1.1111	0.6731
Myristicaceae	*Pycnanthus angolensis*	1	20.0	20.0	0.1777	1.1111	0.6444
Olacaceae	*Strombosia pustulata*	2	46.5	55.0	1.9859	2.2222	2.1040
Combretaceae	*Terminalia superba*	1	67.0	67.0	1.9948	1.1111	1.5530

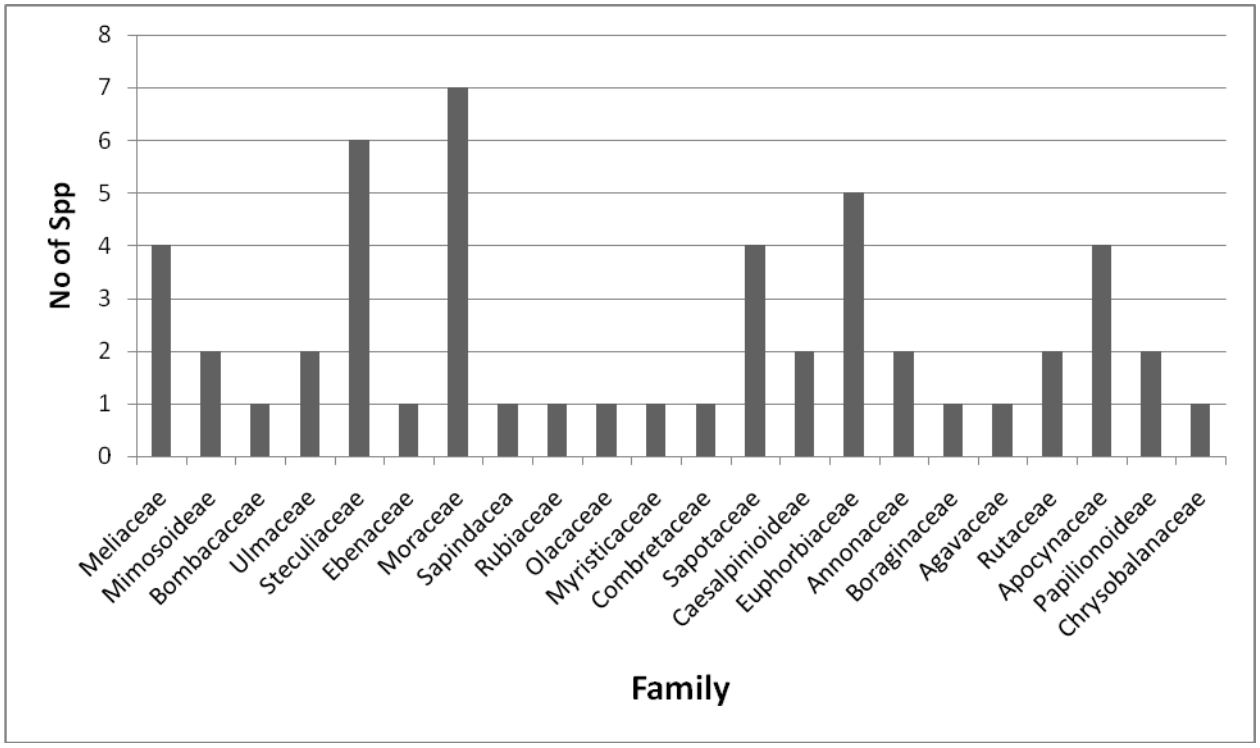

Fig. 2: Family distribution in Igbo-Olua sacred grove

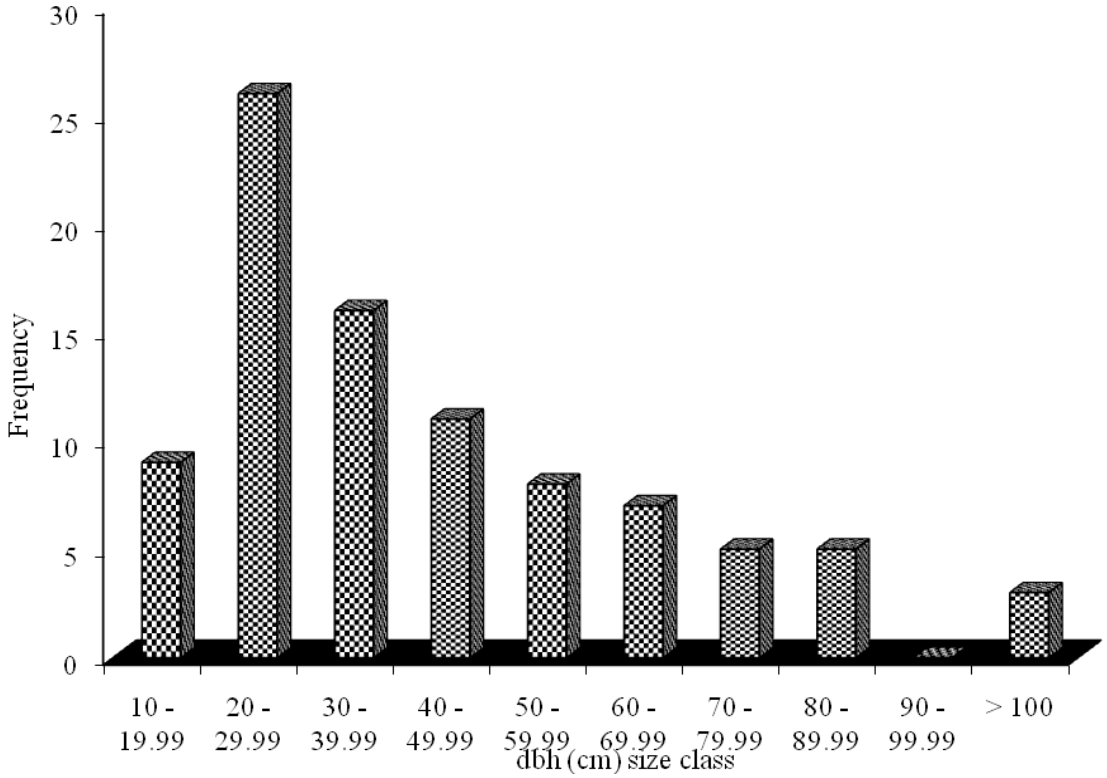

Fig. 3: Diameter Distribution graph of Igbo-Olua sacred grove, IgbaraOke

Conclusion

Sacred groves, in general are community based monuments of biological diversity. They were ritually established and protected on the basis of their religions and holy significance. The study clearly indicated that despite all the threats to biodiversity in Nigeria, Igbo-Olua sacred grove is still intact. Community of Igbara-Oke maintains these grove as part of the culture which strengthening the institution. Cultural values and indigenous knowledge should be considered when developing conservation policies. Advocating the utilization of these cultural values in a framework to encourage conservation at local levels has practical implications for sacred grove protection. It is certain that the present laws and regulations need to be reviewed. Several policy changes would have to take place for management of sacred groves and areas.

REFERENCES

Alabi, K.A (1992): Traditional forest conservation in practice: A case study of Ikire-Ile in Ola–Oluwa Local Government. M.Sc. Degree Dissertation, Department of Forest Resources Management, University of Ibadan, Ibadan.

Brashears, M.B., Fayvan, M.A. and Schuler, T.M. (2004): An assessment of canopy stratification and Tree species Diversity following clearcutting in central Appalanchian Hardwoods, *Forest Science* 50 (i): 54-64.

Federal Environmental Protection Agency (FEPA) (1992): Country Study Report For Nigeria On Cost-Benefits And Needs Of Biodiversity Conservation Sponsored By UN Environmental Programme, National Biodiversity Unit Abuja ,Nigeria 53p.

Federal Department of Forestry (1998): Nigeria Forest Resources Study; Federal Department of Forestry, Abuja.

Godson, C.V. (1998): Some perspectives of traditional African knowledge in biodiversity conservation. In: Traditional knowledge and Modern Concept. *Proceedings of third UNESCO MAB Regional Seminar* on BRAAF. Pp. 43-54.

Myers, N. (1986): Tropical forest: pattern of deforestation. Tropical Rainforests and World Atmosphere. Selected symposium 101.Pp 9-22.

Nath, P.C., Arunchalam A, Khan M.L, Arunchalam K, Bharbhuiya A. R (2005): Vegetation analysis and tree population structure of tropical wet evergreen forests in and around Namdapha National Park, Northeast India.*BiodiversConserv* 14:2109–2136

Oduwaiye E. A., Oyeloye B and Oguntala A. B. (1998): Species Diversity and Potentiality for Forest Regeneration in Okomu Permanent Sample Plot: Forestry and Challenges of Sustainable Livelihood, Proceedings of the 28th Annual Conference of the Forestry Association of Nigeria, Akure, Ondo State, Nigeria, 2002, 4-8 November. pp 264-272.

Ogunleye , A.J. Adeola , A.O., Ojo , L.O. and Aduradola, A.M (2004): Impact of farming activities on vegetation in Olokemeji forest reserve, Nigeria. *Global Nest: the Int. J.*Vol 6, No 2, pp 131-140

Ojo L.O. (2004): The fate of a tropical rainforest in Nigeria: Abeku sector of Omo forest Reserve. *Global Nest* Vol.6 no.2 pp 116-130.

Okali, D.U.U. and Amubode, F.O. (1995): Resources conservation in Oboto, Nigeria. In: Towards Common Ground – Gender and Natural Resources Management in Africa. Pp. 27-47.

Onyekwelu J.C, Adekunle A.J. and Adeduntan S.A (2005): Does tropical rainforest ecosystem possess the ability to recover from severe degradation? In: Popoola L, Mfon P, Oni PI (eds) Sustainable forest management in Nigeria: lessons and prospects. *Proceeding of the 30th Annual Conference of the Forestry Association of Nigeria, Kaduna, 07th–11th Nov. 2005, pp 145–163*

Oyun M.B., Bada S.O., Anjah G.M (2009): Comparative analysis of the flora composition at the edge and interior of Agulii forest reserve, Cameroon. *J. Biol. Sci.* 9(5):431-437

Soladoye M.O, Sonibare M.A, Nadi A.O and Alabi D.A. (2005). Indigenous Angiosperm Biodiversity of Olabisi Onabanjo University Permanent site. *African Journal of Biotechnology 2005; 4 (5):554-562.*

Swane, M.D., Lieberman, D., and Putz, F.E. (1987): The dynamics of tree populations in tropical forest: a review. *J. Trop. Ecol.3: 359-366*

Tsingalia H. M (1990): Habitat severity and patterns of species abundance.*Afri J Ecol*, 28: 190-220.

UNEP (1995): Global Biodiversity Assessment. V.H. Hey-wood(ed). Cambridge University Press.

Vartak V.D., Kumbhojkar M.S and Dabadghao V. (1986): Sacred groves – A sanctuary for lofty trees and lianas. In .Proceedings of the Seminar on Eco development of Western Ghants, Jain SK. (ed), pawan Kumar publications, Jodhpur, Pp. 329-335.